Serial Bridge for Tridium Niagara

User Guide

baudrate.io

niagara4

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1 Introduction

Serial Bridge is a Niagara framework module that creates virtual COM ports communicating over TCP/IP instead of physical serial cables. Each virtual port connects to a low-cost serial-to-Ethernet gateway that converts TCP data back to RS-485 or RS-232 on the device side. It implements the standard Niagara serial port interface and has been tested with common serial drivers, including Siemens Apogee P1[1], Johnson Controls N2, and Modbus RTU.

On a Supervisor running on Windows, the module also gives serial drivers the computer's own COM ports: built-in ports, USB-to-serial adapters, Bluetooth serial ports and virtual COM ports from other software.

Before version 1.1.0 the module was called Virtual Serial Port (`virtualPort-rt.jar`).

Common use cases include:

- **Extra serial ports for JACE** – add more RS-485 ports without additional hardware.
- **Remote RS-485 over IP** – reach serial devices across the network instead of running long cable or deploying another JACE.
- **Supervisor direct integration** – connect a Supervisor directly to serial devices without any JACE in between.
- **Local COM ports on a Windows Supervisor** – plug a USB-to-RS-485 adapter or an optical meter probe into the Supervisor and poll the devices with any Niagara serial driver.

The module has been tested with common serial-to-Ethernet gateways, including Moxa NPort, Lantronix XPort, Digi Connect, Perle IOLAN, USR-TCP232, Schneider EGX, Atop SE59xx, and Advantech EKI.

2 Requirements

- Niagara-powered device with software v4.8 or later, such as JACE, Supervisor, or any OEM version
- Serial Bridge module and license
- For virtual ports: a serial-to-Ethernet gateway with a known IP address and TCP port, and TCP/IP network access between the Niagara host and the gateway
- For local COM ports: a Supervisor on 64-bit Windows, and the Windows driver for the USB-to-serial adapter, if one is used

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3 Quick Start

1. Copy the serialBridge-rt.jar module to the Niagara `/modules` folder.
    a. If the module is hosted on a Supervisor: restart the Supervisor station.
    b. If the module is hosted on a JACE: import the module into the JACE and restart it.
2. Open Workbench and navigate to the station.
3. If running on a **Supervisor**: open the **serialBridge** palette and add **Serial Bridge Service** under **Services / Platform Services** in the station navigation tree.
4. Open the **serialBridge** palette and add a **Virtual Port** component under the **Serial Bridge Service** (Supervisor) or under the native **Serial Port Platform Service** in **Services / Platform Services** (JACE).
5. Configure **Address** and **Port** properties to match the serial-to-Ethernet gateway.
6. Enter the license code in the **License** property. On a Supervisor, the license is on the **Serial Bridge Service**. On a JACE, a **License** property appears automatically on the native serial service after the first virtual port is added.
7. Open the serial driver and enter the virtual port name exactly as it appears in the station (e.g., `VCOM1`) into the driver's **Port Name** property.

To use a local COM port on a Windows Supervisor instead, skip steps 4 and 5. The **Serial Bridge Service** lists the computer's COM ports by itself; enter the COM port name (e.g., `COM3`) into the driver's **Port Name** property.

4 Serial Bridge Service

The Serial Bridge module works on both Supervisor and JACE, but the setup is different because each platform manages serial ports in its own way.

4.1 Supervisor

On a Supervisor, add **Serial Bridge Service** from the **serialBridge** palette. Virtual ports added under this service are visible to all serial drivers in the station.

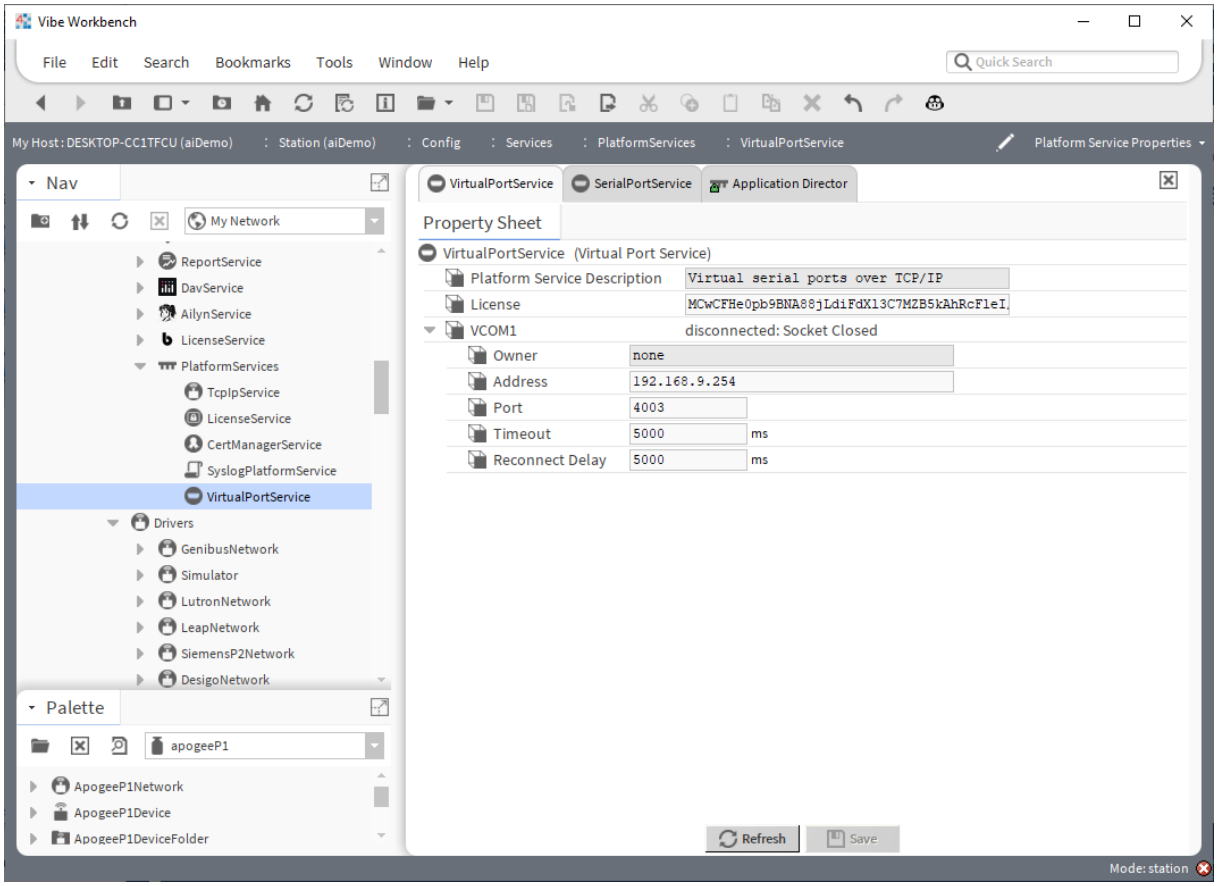


Figure 1: Serial Bridge Service on a Supervisor

The service has the following properties:

- **Platform Service Description** – read-only description of the service.
- **License** – the code that allows the module to run on your host.

Virtual ports are added as child components under the service. Each child appears as a named serial port in the Niagara port list. To communicate with field devices directly from a Supervisor, the Supervisor license must include global capacity for devices and points.

4.2 JACE

On a JACE, there is no separate Serial Bridge Service. The JACE already has a built-in **Serial Port Platform Service** under **Platform Services** that manages physical COM ports. Virtual ports are added directly under this native service, alongside the existing COM1, COM2, and other physical ports.

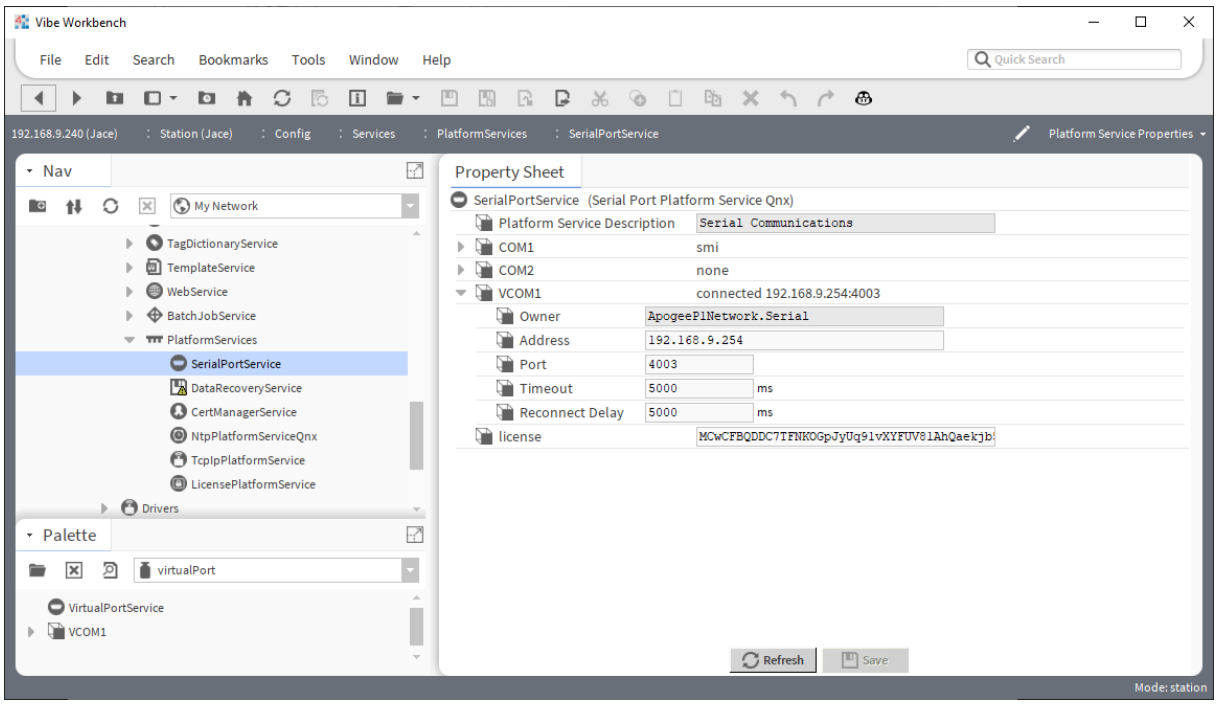


Figure 2: Virtual Port on a JACE under the native Serial Port Platform Service

The first time a virtual port starts on a JACE, it creates a **License** property on the native serial service automatically. Enter the license code there – all virtual ports under the same service share one license.

No palette or service installation is needed on a JACE. Add a **Virtual Port** component directly under the native serial service and it is ready to use.

5 Virtual Ports

Each **Virtual Port** component represents a single TCP connection to a serial-to-Ethernet gateway. In the palette, the component is called **VCOM1**. When multiple virtual ports are added, Niagara automatically names them VCOM2, VCOM3, and so on. The component name is the port name that serial drivers use to reference it. The properties below are the same on both Supervisor and JACE.

Properties:

- **Owner** – read-only field showing the driver that currently holds the port. Displays none when the port is not in use.
- **Address** – IP address or hostname of the serial-to-Ethernet gateway. Default: `192.168.1.1`.

- **Port** – TCP port number of the gateway. Default: `4001`. Common values are 4001 (Moxa), 10001 (Lantronix), and 2101 (Digi). Many gateways have multiple serial ports, each with its own TCP port number (e.g., 4001, 4002, 4003). Create a separate virtual port for each serial port on the gateway.
- **Timeout** – connection and read timeout in milliseconds. Default: `5000`. Increase this value for gateways on slow or high-latency networks.
- **Reconnect Delay** – minimum time in milliseconds between reconnection attempts after a connection failure. Default: `5000`. Prevents flooding the gateway with connection requests during an outage.

The current connection state is displayed next to the port name in the navigation tree: `idle`, `connecting`, `connected`, `disconnected`, `closed`, or `error` with a description.

5.1 Connection Behavior

The virtual port does not connect when it is added to the station. The TCP connection is established lazily – when a serial driver first reads from the port. This design ensures that no network resources are consumed by unused ports.

If the connection is lost, the port automatically reconnects on the next read attempt, subject to the **Reconnect Delay** timer. This means serial drivers do not need to handle reconnection logic – the virtual port handles it transparently.

To manually reset a connection, use the **Reset Port** action on the virtual port component.

5.2 Gateway Configuration

The serial-to-Ethernet gateway must be configured in **TCP Server** mode (sometimes called “Raw TCP” or “Direct IP” mode). In this mode, the gateway listens on a TCP port and forwards data bidirectionally between the TCP socket and the serial port. Do not use Telnet, RFC 2217, or other encapsulated modes.

Gateway serial port parameters (baud rate, data bits, stop bits, parity) must match the settings expected by the serial device. These parameters are configured on the gateway itself, not on the virtual port – the virtual port only handles the TCP transport layer.

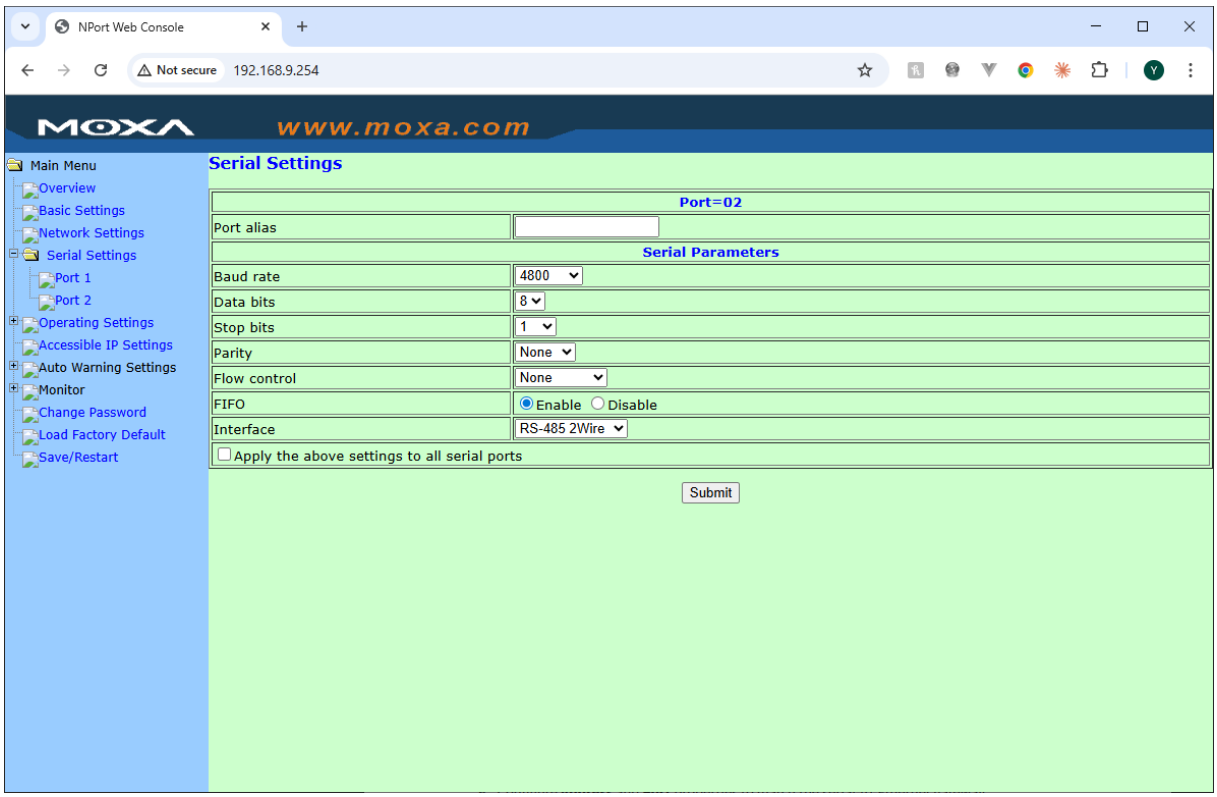


Figure 3: Moxa NPort serial settings web page

The screenshot above shows the serial settings page of a Moxa NPort gateway. Set the baud rate, data bits, stop bits, and parity to match the field device, and select the correct interface (RS-232, RS-422, or RS-485). Refer to the gateway manufacturer documentation for details on operating mode and network settings.

6 Local COM Ports

On a Supervisor running on 64-bit Windows, the **Serial Bridge Service** also lists the COM ports of the computer: built-in ports, USB-to-serial adapters, Bluetooth serial ports and virtual COM ports created by other software. Each one appears under the service with its Windows name, such as **COM3**, next to the virtual ports. A serial driver uses it by entering that name into its **Port Name** property, the same way as for a virtual port.

The service looks for COM ports every time the station starts. To add a port that was connected later, for example a new USB adapter, run the **Discover Ports** action on the **Serial Bridge Service**. Ports are never removed automatically: a port that Windows no longer reports shows `not present`. Delete it by hand if it is not coming back.

Properties:

- **Description** – read-only name that Windows gives the port, such as `USB Serial Port` or `Standard Serial over Bluetooth link`. It helps tell several adapters apart.

The port state is displayed next to the port name in the navigation tree:

- `open 9600 8N1` – a driver holds the port, with the baud rate, data bits, parity and stop bits in use.
- `closed` – no driver is using the port.
- `error: COM3 is in use or not present` – the port could not be opened. Another program holds it, or the adapter is unplugged.
- `disconnected: COM3` – the adapter was unplugged while a driver was using it.
- `not present` – Windows no longer reports the port.

6.1 Serial Settings

Unlike a virtual port, a local COM port is the real serial interface. The baud rate, data bits, parity, stop bits and flow control set in the serial driver are applied to the port directly, and the driver can change them while it runs, as protocols with a baud rate switch need.

6.2 USB Adapters

When a USB-to-serial adapter is unplugged while a driver is using it, the port shows `disconnected` and the driver reports a communication error. Plug the adapter back into the same USB socket: Windows gives it the same COM name and the port opens again by itself about a second later, without a station restart.

6.3 Flow Control

With RTS/CTS or XON/XOFF flow control, the device can pause the data the port sends. If the device holds it paused for more than 5 seconds, for example because a cable is unplugged and CTS stays low, the send fails and the driver reports the device as down. The other devices on the same port keep being polled, and communication resumes as soon as the device lets data through again.

7 Serial Driver Integration

The following screenshot shows a Siemens Apogee P1 driver on a JACE configured to use a virtual port instead of a physical COM port. The **Port Name** in the driver's **Serial Config** is set to **VCOM1** – the name of the virtual port component.

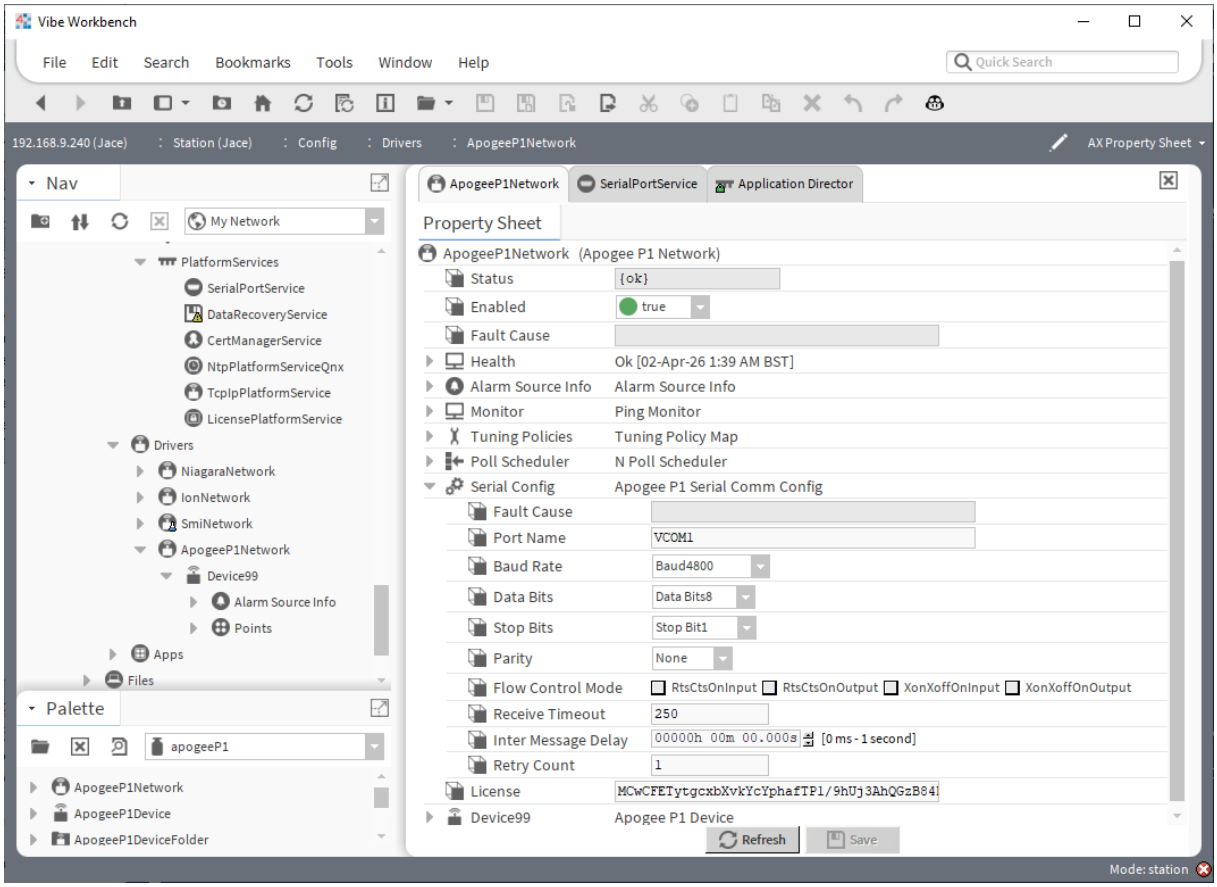


Figure 4: Apogee P1 driver on a JACE using a virtual port

In this configuration, the JACE communicates with Apogee field controllers via a serial-to-Ethernet gateway instead of a direct RS-485 cable. This allows the JACE to reach serial devices on a remote network segment, or to add more serial trunks without additional hardware.

The same approach works on a Supervisor: the driver's **Port Name** is set to the name of the virtual port, and the rest of the driver configuration remains unchanged.

8 Licensing

The Serial Bridge module requires a license to operate. Each license is bound to a specific Niagara host and defines the number of virtual ports that can be open simultaneously.

- On a **Supervisor**, the license code is entered in the **License** property of the **Serial Bridge Service**.
- On a **JACE**, the license code is entered in the **License** property that appears automatically on the native Platform serial service.

All virtual ports under the same parent service share one license. The license is validated every time a serial driver opens a virtual port or a local COM port. If the license is missing, invalid, or expired, the port open operation fails and the driver reports a communication error.

Only the licensed number of ports can be open simultaneously. Virtual ports and local COM ports count together, and only while a driver holds them open. Additional ports will be denied until an existing port is released by its driver.

A demo mode is available for evaluation. In demo mode, the module operates without a license for a limited time after each station restart. After the demo period expires, a valid license is required.

To obtain a license, contact support@baudrate.io with your Niagara host ID. The host ID can be found in the Workbench Platform administration view.

9 FAQ

9.1 The virtual port status shows “error” and the driver cannot communicate.

- Verify that the gateway IP address and TCP port are correct.
- Try to ping the gateway from the Niagara host to confirm network connectivity.
- Check that the gateway is configured in TCP Server (Raw TCP) mode, not Telnet or RFC 2217 mode.
- Increase the **Timeout** property if the gateway is on a slow or high-latency network.
- Check that no firewall is blocking the TCP connection between the Niagara host and the gateway.

9.2 The driver works intermittently or loses communication.

- Check the connection state displayed next to the port name in the navigation tree. If it alternates between “connected” and “disconnected”, the TCP connection is dropping. This is often caused by network instability or gateway configuration issues.

- Increase the **Reconnect Delay** to avoid overwhelming the gateway with rapid reconnection attempts.
- Ensure the gateway serial parameters (baud rate, parity) match the field device. Mismatched parameters cause garbled data and timeouts at the driver level.
- If multiple drivers share the same gateway, ensure each serial port on the gateway has its own TCP port number.

9.3 Can I use the virtual port with any serial driver?

The virtual port implements the standard Niagara serial port interface and has been tested with common serial drivers, including Modbus RTU, Siemens Apogee P1, and Johnson Controls N2. Most serial drivers work without modification. However, drivers that rely on precise timing, high baud rates, or multi-master protocols may experience issues due to TCP/IP latency. Contact support@baudrate.io if you are unsure about compatibility with a specific driver.

9.4 How many virtual ports can I create?

The number of virtual ports is defined by your license. Contact support@baudrate.io for licensing options.

9.5 Does the virtual port support serial port parameters like baud rate and parity?

The virtual port does not use serial parameters itself – it communicates over TCP/IP. Serial parameters (baud rate, data bits, stop bits, parity) are configured on the serial-to-Ethernet gateway, which handles the conversion between TCP and the physical serial interface.

9.6 Can I use the virtual port on both JACE and Supervisor?

Yes. The module is compatible with both JACE and Supervisor platforms running Niagara v4.8 or later. On a Supervisor, virtual ports live under the **Serial Bridge Service**. On a JACE, they are added under the native Platform serial service.

9.7 Does the virtual port work with RS-232 devices?

Yes. The virtual port works with both RS-485 and RS-232 devices. The serial interface type (RS-232, RS-422, or RS-485) is determined by the serial-to-Ethernet gateway, not by the virtual port. Select a gateway model that supports the required interface and configure it accordingly.

9.8 A COM port shows “error: . . . is in use or not present”.

- Another program holds the port. Close terminal programs, vendor configuration tools or a second station that use the same COM port.
- The USB adapter is unplugged, or Windows gave it a different COM name after it was moved to another USB socket. Check the name in the Windows Device Manager under **Ports (COM & LPT)** and run **Discover Ports**.

9.9 A COM port does not appear under the Serial Bridge Service.

- Check that Windows lists the port in the Device Manager under **Ports (COM & LPT)**. A USB adapter needs its Windows driver installed first.
- Run the **Discover Ports** action on the **Serial Bridge Service**.
- Local COM ports are available on Windows only. On a JACE, use its own COM ports under the native **Serial Port Platform Service**.

9.10 The license property does not appear on the JACE.

The **License** property is created automatically the first time a virtual port starts on a JACE. Add a virtual port component under the Platform serial service and restart the station. The license property will appear on the parent service.